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REDESCRIPTION OF *HOGNA COLORADENSIS* (BANKS 1894) FROM THE SOUTHWESTERN UNITED STATES (ARANEAE, LYCOSIDAE)

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ABSTRACT. *Hogna coloradensis* (Banks 1894) (Araneae, Lycosidae) is redescribed. Banks' original description from 1894 made identification difficult. Internal and external genitalia of both sexes are herein described and illustrated. The spider is found east of the Rocky Mountains from Wyoming south to Mexico. It constructs shallow, straight burrows that it sometimes closes with small rocks and debris. *Lycosa evagra* Chamberlin 1925 is synonymized with *H. coloradensis*.

Keywords: Taxonomy, wolf spider, synonymy

Currently 24 species of the genus *Hogna* Simon 1885 are listed for North America, and 11 for Mexico (Platnick 2006). Although some of these species are true representatives of the genus *Hogna* based upon morphological characters and sequence data, others will likely be placed in a new genus (or genera) and still others will likely be moved to *Rabidosa* (Dondale, pers. comm.). Nevertheless, a need exists to correctly identify those species currently placed in the genus until such time as a formal generic revision can be completed. Identification of these species is made challenging by the often poor descriptions with few or no illustrations. For example, Banks' original description of *Lycosa coloradensis* Banks 1894 made little mention of the epigynum saying only that, "The epigynum is red, it is an oblong cavity with undulate margins, from the bottom projects a capitate septum." He has only a cursory description of the male palp, and provides no illustrations of either sex. Here we present a redescription of *H. coloradensis* with genitalic illustrations for both sexes.

Illustrations were made from digital photographs taken using an Olympus U-CMAD3 digital camera mounted on an Olympus SZX12 stereomicroscope. All measurements are in millimeters. Specimens used in this study are deposited in the Museum of Comparative Zoology at Harvard University in Cambridge, MA (MCZ); the American Museum of Natural History in New York, NY (AMNH); the Division of Plant Industry in Gainesville, FL (DPI); New Mexico State University (NMSU); the University of Colorado in Boulder (CU); and the Denver Museum of Nature & Science (DMNS).

Abbreviations: AER = anterior eye row; PER = posterior eye row; PME = posterior median eye; PLE = posterior lateral eye. Coordinates for collection locales are provided unless there was too much uncertainty regarding the locale (particularly for some of the older records).

TAXONOMY

Family Lycosidae Sundevall 1833
Hogna Simon 1885

Type species.—*Lycosa radiata* Latreille 1819, by original designation.

Hogna coloradensis (Banks 1894)
Figs. 1–21

Lycosa coloradensis Banks 1894:50; Banks 1898: 268; Chamberlin 1908:249–251, plate XVII figs. 6, 7.

Lycosa evagra Chamberlin 1925:227. **New synonymy.**

Hogna evagra (Chamberlin 1925): Roewer 1955: 254; Platnick 2006.

Hogna coloradensis (Banks 1894): Roewer 1955: 258; Platnick 2006.

Type material.—*Lycosa coloradensis* Banks

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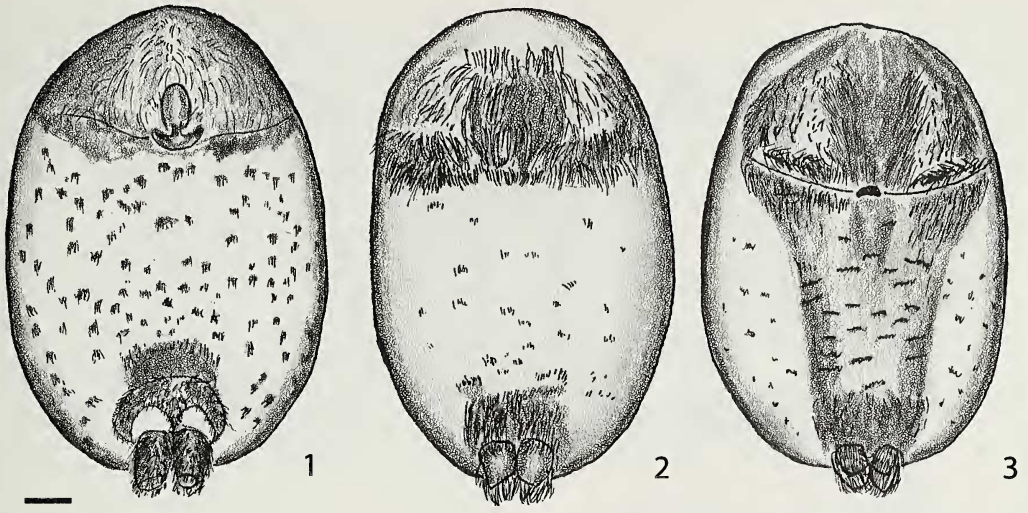
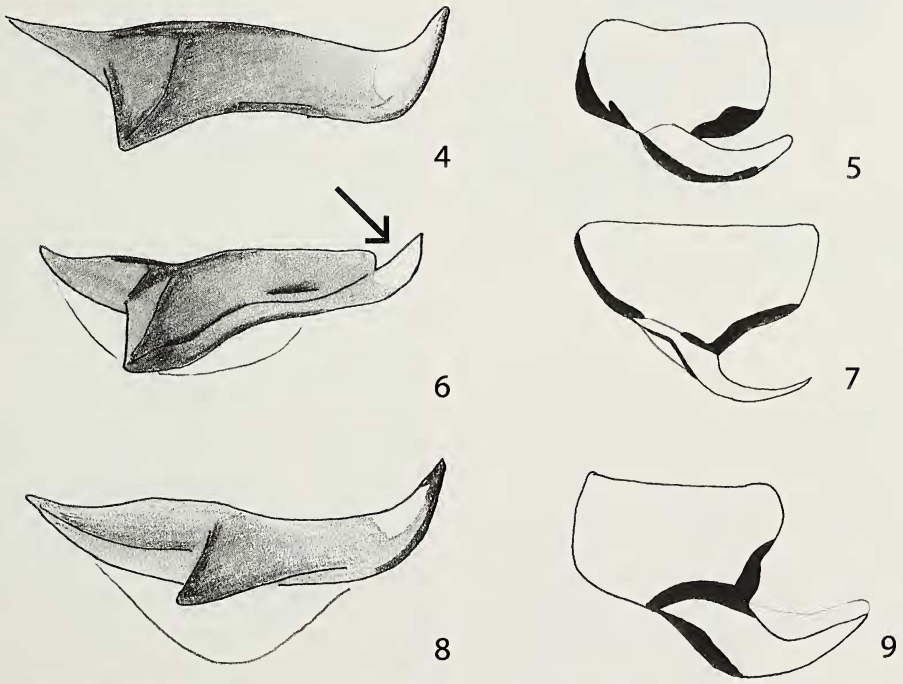


Figures 1–3.—*Hogna coloradensis* venters. 1. Female from Grant County, New Mexico; 2. Male from Lordsburg, Hidalgo County, New Mexico; 3. Male from Silver City, Grant County, New Mexico. Scale line = 1 mm.



Figures 4–9.—*Hogna coloradensis* male palpal structures (prolateral views of median apophyses illustrated). 4. Median apophysis of specimen from Fort Stockton, Pecos County, Texas; 5. Terminal apophysis of Fort Stockton specimen; 6. Median apophysis of specimen from Monahans Sandhills State Park, Ward County, Texas, arrow points to area of missing membrane (see text); 7. Terminal apophysis of Monahans Sandhills State Park specimen; 8. Median apophysis of specimen from Hermosillo, Sonora, Mexico; 9. Terminal apophysis of Hermosillo specimen.

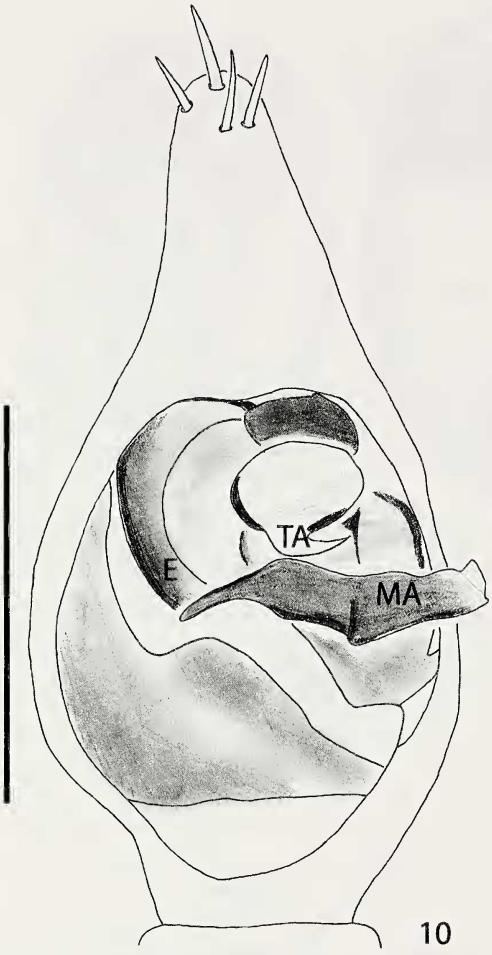
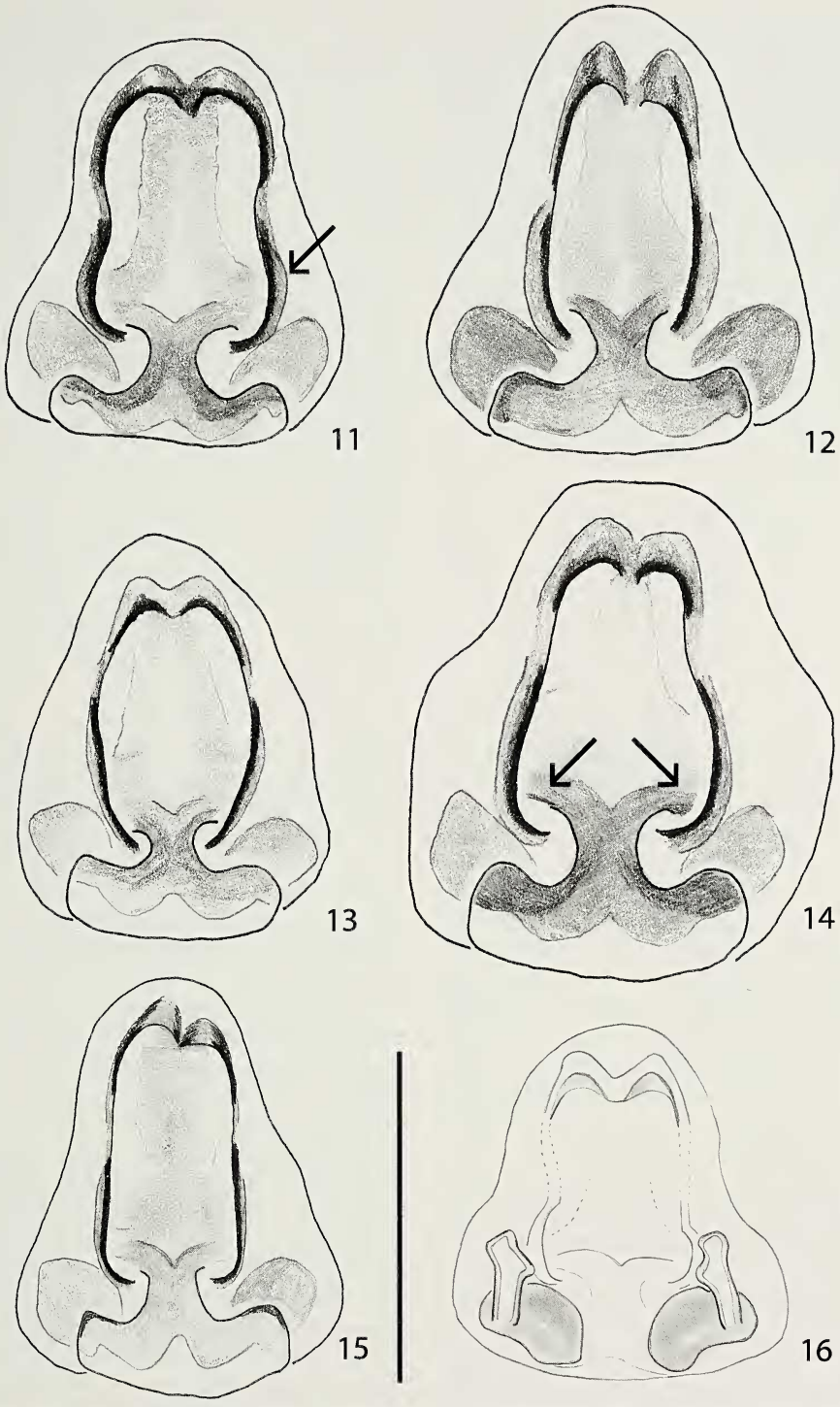


Figure 10.—Palp, ventral view, specimen from Erie, Weld County, Colorado. E = embolus (tip hidden), TA = terminal apophysis, MA = median apophysis (see text). Scale line = 1 mm.

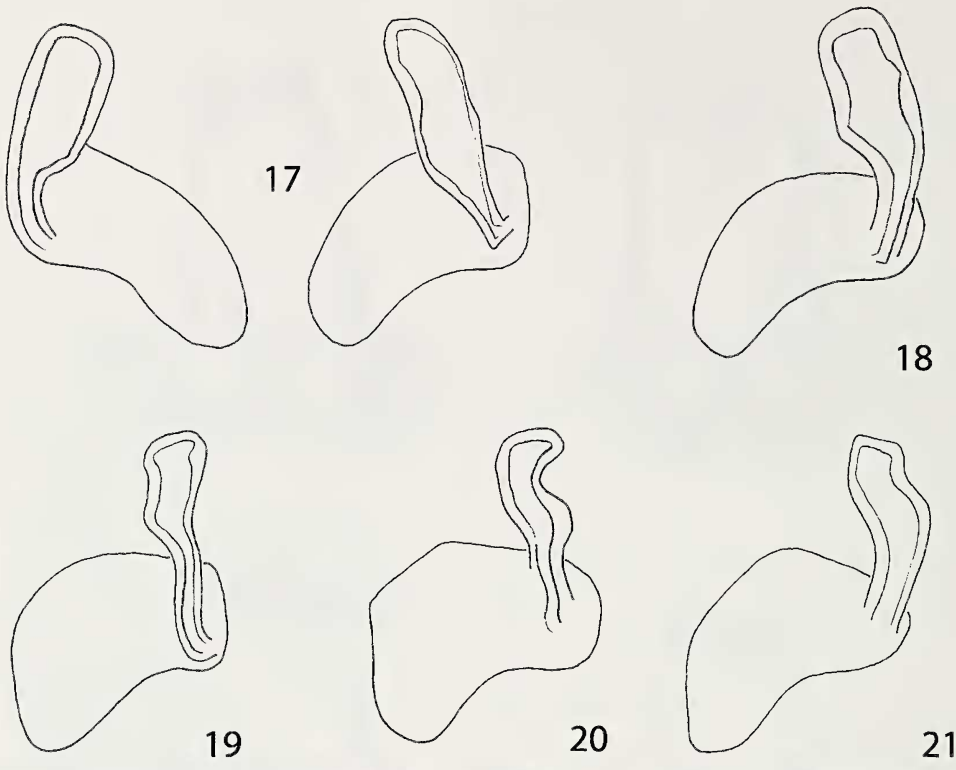
1894: 1 syntype male, 2 syntype females: USA: Colorado: *Larimer County*, Fort Collins (40°35′N, 105°05′W, 1525 m elev.), no date, Nathan Banks collection (MCZ 20844).

Lycosa evagra Chamberlin 1925: Holotype female: MEXICO: *Chihuahua*: Montezuma Station, exact location unknown, no date or collector (MCZ 1303).

Other material examined.—MEXICO: *Sonora*: 1 ♂, Hermosillo (29°04′N, 110°58′W), no date (MCZ 65765); USA: *Arizona*: Cochise County: 1 ♂, 1 ♀, 9.6 km E. of Portal, 1 June 1955 (CU), 1 ♂, 1 ♀, 9 June 1962 (DMNS ZA.2270); 1 ♂, 1 ♀, Portal (31°54′N, 109°08′W), 9 July 1970 (DMNS ZA.362); 1 ♂, SE. of Portal, 25 June 1970 (DMNS ZA.325); *Colorado*: Denver County: 1 ♂, Denver (39°44′N, 104°59′W), 4 February 1939 (CU); 1 ♀, Smokey Hill, 5 July 1938 (CU); Las Animas County: 1 ♀, near Chacuaco Creek (37°33′N, 103°38′W), 12 June 1962 (CU); Otero County: 1 ♀, Comanche National Grasslands (39°29′N, 105°16′W), 29 May 2004 (DMNS ZA.7554); Pueblo County: 1 ♂, Pueblo West (38°18′N, 104°46′W), 25 September 1999 (DMNS ZA.9841); Weld County: 1 ♀, 20.9 km N. of New Raymer, 3 July 1962 (CU), 1 ♀, 3 July 1962 (CU); 1 ♂, 1291 County Rd. 11, Erie (40°01′N, 104°57′W), 7 October 1999 (DMNS ZA.9840),1 ♀, Bones Galore, Pawnee National Grasslands (40°43′N, 103°48′W), 9 June 1999 (DMNS ZA.9839), 1 ♀, 10 June 1999 (DMNS ZA.9842); *New Mexico*: Dona Ana County: 1 ♂, Jornada IBP grassland site (32°36′N, 106°44′W), 26 April–3 May 1997 (NMSU); 3 ♂, 2 ♀, Jornada Range, 2.7 km S. of South Well, 1 April 1990 (NMSU); 4 ♂, 1 ♀, Jornada Range, 12 km WNW. of South Well, June 1989 (NMSU); 1 ♂, Jornada Range, Plot 1, 18–19 April 2000; 1 ♂, Everhart Ranch, Gap Tank, S. of Hotch (31°53′N, 107°03′W), 19 May 1977 (NMSU); Grant County: 1 ♀, Hurley (32°41′N, 108°07′W), 2 August 1973 (DPI), 1 ♀, 16 May 1972 (DPI), 1 ♂, 1 June 1972 (DPI), 2 ♀, 16 July 1972 (DPI), 1 ♀, 14 August 1972 (DPI), 1 ♀, 1 September 1972 (DPI), 1 ♂, 16 May 1973 (DPI), 8 ♂, 16 June 1973 (DPI), 6 ♂, 30 June 1973 (DPI), 1 ♂, 1 July 1973 (DPI), 4 ♂, 17 July 1973 (DPI), 1 ♀, 16 September 1973 (DPI); 1 ♀, Silver City (32°46′N, 108°16′W), 15 August 1972 (DPI), 3 ♂, 31 May 1973 (DPI); Hidalgo County: 1 ♂, Antelope Wells, U Bar Ranch (31°20′N, 108°30′W), 30 June 1977 (DPI); 1 ♂, Big Hatchet Ranch (31°42′N, 108°25′W), 22 June 1977 (DPI); 1 ♂, Campbell Well, Huecos Mountains (31°27′N, 108°13′W), 13 July 1977 (DPI); 1 ♂ Doyle Line Camp, 20 June 1977 (DPI); 1 ♂, Doyle Tank, Sierra Rica Mountains, 9 June 1977 (DPI); 1 ♀, Lordsburg (32°21′N, 108°42′W), 16 July 1972 (DPI), 2 ♂, 15 May 1972 (DPI), 1 ♂, 1 June 1972 (DPI), 5 ♂, 30 June 1972 (DPI), 1 ♂, 14 July 1972 (DPI), 1 ♂, 2 ♀, 16 July 1972 (DPI), 4 ♂, 15 May 1973 (DPI), 2 ♂, 31 May 1973 (DPI), 2 ♂, 29 June 1973 (DPI); 2 ♂, Stone Cabin (31°24′N, 108°17′W), 31 May 1977 (CU); Lea County: 1 ♀, 17.7 km N. of Tatum, 26 June 1991 (NMSU); San Miguel



Figures 11–16.—*Hogna coloradensis* epigyna. 11–15. Ventral view, 16. Dorsal view; 11. Syntype, Fort Collins, Larimer County, Colorado, arrow points to undulation along posterior-lateral edge of atrium (see text); 12. Specimen from Chihuahua, Mexico; 13. Specimen from Silver City, Grant County, New Mexico; 14. Specimen from Hurley, Grant County, New Mexico, arrows point to expansion of median septum (see text); 15. Specimen from Jornada Range, Dona Ana County, New Mexico; 16. Specimen from Comanche National Grasslands, Otero County, Colorado. Scale lines = 1 mm.



Figures 17–21.—*Hogna coloradensis* female spermathecae dorsal views. 17. Pair of spermathecae of specimen from Monahans Sandhills State Park, Ward County, Texas; 18. Another specimen from Monahans Sandhills State Park, Ward County, Texas; 19. Specimen from Portal, Cochise County, Arizona; 20. Specimen from Chihuahua, Mexico; 21. Specimen from Portal, Cochise County, Arizona.

County: 1 ♂, Gallinas River, Las Vegas (35°34′N, 105°12′W), 11 June 1949 (MCZ 65766); Santa Fe County: 1 ♀, SW. of Santa Fe (35°41′N, 105°56′W), 24 April 1977 (MCZ 65767); *Texas*: Pecos County: 1 ♂, 1 ♀, Fort Stockton (30°53′N, 102°52′W), 9 July 1974 (AMNH); Ward County, 3 ♂, 2♀, Monahans Sandhills State Park (31°38′N, 102°49′W), 9 July 1974 (AMNH).

Diagnosis.—*Hogna coloradensis* can be separated from all other *Hogna* and Lycosidae by a dark area immediately anterior to the epigastric furrow as well as a small dark area just anterior to the spinnerets, the rest of the venter is light with spots (Fig. 1). Although this color pattern was seen in 94% of the specimens examined, the remainder of the specimens showed some variability (Figs. 2, 3; we describe this variability below). Males can be identified by the sharply upturned prolateral end of the median apophysis (Figs. 4, 6, 8), the singular, sickle-shaped terminal apophysis (Figs. 5, 7, 9), and the embolus tip hidden behind the median apophysis (Fig. 10). Females (Figs. 11–16) can be separated by the existence of an undulation along the posterior-lateral edge of the atrium (Fig. 11, arrow), the corresponding median septum that expands to fill the posterior portion of the atrium (Fig. 14, arrows), and the shape of the spermathecae (Figs. 16–21).

Description.—*Male (syntype):* Total length 10.99 mm, carapace length 5.37 mm, carapace width 4.17 mm. Carapace brown with a median band of lighter hairs extending from the thoracic furrow to the PME. Other lighter hair bands radiating from the thoracic furrow. Ocular area darker between eyes. AER 0.97 mm wide, narrower than PME. PER wider posteriorly, PME 0.99 mm apart measured from center to center, PLE 1.53 mm apart from eye centers. Posterior eyes 0.49 mm in diameter, anterior eyes 0.20 mm in diameter.

Chelicerae, sternum, and coxae dark brown. Three retromarginal and three promarginal teeth. Labium dark except for light tip. Legs

Table 1.—Leg measurements in mm for *Hogna coloradensis* male syntype.

	I	II	III	IV
Femur	5.17	4.68	4.24	5.80
Patella	1.85	1.95	1.91	1.92
Tibia	4.80	4.19	3.42	3.63

brown, heavily spined. Ventral spination of leg I: femur with 1 prolateral spine, patella with 1 retrolateral spine, tibia with 3 pairs of ventral spines and 1 distal retrolateral spine, metatarsus with 1 ventral spine. Leg length: IV, I, II, III (Table 1 presents femur, patella, and tibia measurements for syntype male). Abdomen with a dark heart mark and two lighter spots along each side of the heart mark. Four chevrons follow the heart mark posteriorly. Venter pale except for a dark epigastric region and a dark spot anterior to the spinnerets. Terminal apophysis sickle-shaped, anterior region wrinkled but without prominent ridges. Embolus originating from the anteriormost region of palp, curving along retrolateral side until middle of palp (Fig. 10). Embolus tip not visible, located horizontally behind the median apophysis. Median apophysis originates from tegulum on prolateral side, triangular, appears shaped like a shark fin when viewed anteriorly. Prolateral tip of median apophysis abruptly upturned when viewed ventrally, lighter than rest of median apophysis (Fig. 10). Tip of palpal cymbium with 2 stout spines.

Female (syntypes, n = 2) (Fig. 11): Total length 13.67, 14.46 mm; carapace length 5.84, 6.53 mm; carapace width 3.94, 4.62 mm; femur I length 3.61, 5.01 mm. Coloration same as in the male except for: carapace not as covered with hair-like setae, legs with more hair-like setae, white marks on abdomen more visible. Epigynum is red, the anterior margin is heavily sclerotized with double anterior hoods. Median septum approximately one-half width of atrium anteriorly, expanding into lateral cavities just posterior to the middle of the atrial cavity (Fig. 11). Posterior end of median septum inverted T-shaped, as wide as or slightly wider than atrial cavity at its widest, not excavated on ends.

Variation.—*Hogna coloradensis* has many size, genitalic, and color variations evident throughout its range (Figs. 1, 12–21). Overall male total length can range from 9.49–13.76 mm (n = 8) and female total length can range from 10.50–20.10 (n = 6). The male syntype has a row of three spines on the distal end of the pedipalpal femur; however, every other *H. coloradensis* examined, including the female syntypes, have four spines.

Spiders collected in Colorado match Banks' syntypes in all respects; however as specimens progress south, variations become more evident. Southern Arizona, western New Mexico and south into northern Mexico may see the atrial undulations of the epigynum diminish until they are almost not visible when viewed ventrally (Figs. 12–15); however, upon being cleared they are evident. The atrium may also take on a more rectangular shape (Fig. 15). There is variation throughout the species' range in the shape of the narrow arm of the spermatheca as well (Figs. 16–21).

One set of spiders collected from Monahans Sandhills State Park in Texas showed more variation than normal. These spiders are smaller and lacked almost all of the characteristic dark coloration on the venter of the abdomen (Fig. 2). The epigynum differed in that the atrium was shorter and the posterior T section of the median septum was thicker than usual (similar to Fig. 14). Also the spermathecae appear thinner (Fig. 17). The male palp appears consistent with other specimens including the syntype except that, in some of the specimens, the upturned end of the median apophysis has a notch where, in other specimens, a continuous thin membrane exists (Fig. 6, arrow). Light colored males were also found from the Jornada Range in Dona Ana County, New Mexico.

Another area of variation appears in southeast New Mexico. These spiders have the ventral area between the epigastric furrow and the spinnerets filled in with dark spots. The spots are organized into two or three longitudinal rows (Fig. 3). The palpal characteristics and the epigynal characteristics match the general description of *H. coloradensis*. Because there is much variation in *H. coloradensis* regarding the thickness of the spots found on the venter of the abdomen these specimens are assumed to be a dark variation of *H. coloradensis*.

Specimen notes.—The syntypes of *L. coloradensis* were apparently dried out and relaxed in 1958. Banks (1894) reported 2 males and 2 females collected, however the vial con-

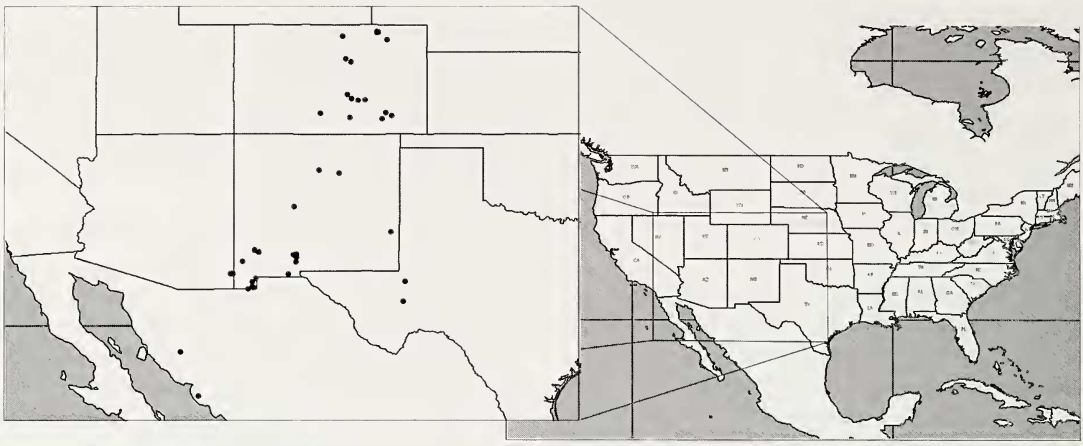


Figure 22.—Specimen localities of *Hogna coloradensis*.

tains only 1 male. The abdomen of one of the females is separated and the spider shows damage from being dried out.

In Muma's 1980 paper his *Lycosa* sp. nr. *coloradensis* is the darker variation noted above. Several other vials from AMNH and DPI identified by either Gertsch or Muma were also identified as *Lycosa* sp. nr. *coloradensis*. These specimens were clearly not *H. coloradensis* but were, instead, *Geolycosa riograndе* (Wallace 1942), *G. missouriensis* (Banks 1895), *Hogna baltimoriana* (Keyserling 1877), or were the dark variation of *H. coloradensis*.

Habitat and behavior.—In a study of a sandy dune environment vs. a rangeland environment in New Mexico, *H. coloradensis* (*Lycosa coloradensis* in text) was one of the dominant species in the sandy environment and almost absent from the rangeland environment (Muma 1980). The sandy dune area consisted of barchan and parabolic dunes with sparse shrubby vegetation in the interdunal area. Half of the traps were set on the advancing side of a barchan dune (Muma 1980). Another study comparing a Piñon-Juniper forest to a grassland ecosystem, also in New Mexico, found that *H. coloradensis* was almost absent from the Piñon-Juniper study area (Muma 1974, 1980). The grassland was a sand-clay alluvium with some gravelly rocks dominated by low grasses and shrubs and was actively used as rangeland. This spider was also found in a mixed rangeland/grassland by Gertsch & Reichert (1976) and was also collected in a similar habitat from southeastern Colorado using a headlamp at night (JS pers. obs.).

Spiders from Monahans Sandhills State Park in Texas were described as being obligate burrowers and showing distress when access to the burrow was blocked (Jack Brookhart pers. obs.). Muma (1975) mentions *H. coloradensis* as a burrower; however, in the lab some spiders will construct their own burrows while other *H. coloradensis* will readily use vials inserted into the substrate as burrows (JS pers. obs.). The spider has been collected from small mammal and other burrows. The burrow made by *H. coloradensis* is a small, shallow (about 5–15 cm deep), straight burrow, however the burrow may angle if an obstacle is encountered. These burrows lack the turret found in *Geolycosa* burrows. Instead, they appear to line the entrance of the burrow with silk. The spider also uses small rocks and debris to close the burrow entrance. The spider appears to use the burrow as a retreat during the day, roaming at night for prey. This behavior is similar to that of *H. carolinensis* (Walckenaer 1805) (JS pers. obs.). They have also been seen digging after prey (JS pers. obs.).

Distribution.—*Hogna coloradensis* has been found from northern Mexico northward through eastern Arizona, New Mexico, and Colorado to the Wyoming border (Fig. 22). It also is found in western Texas. Chamberlin (1908) makes note of it being found in Kansas and Nebraska; however, those specimens could not be located for verification. The spider is also mentioned in Rapp (1980) as being

found in Mitchell, Nebraska; however, those specimens also could not be found to verify and the record may be from a direct quote out of Worley (1927). Nevertheless, the western edge of both those states as well as southern Wyoming would have suitable habitats. This species does not appear to extend into the great basin area of Utah.

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